OUR BOOK SHELF

Zoology for Students. By C. Carter Blake, D.Sc. (Daldy, Isbister, and Co., 1875.)

IN this work Dr. C. C. Blake has published, as he tells us in the preface, the substance of his annual course of lectures on zoology at Westminster Hospital. Beginning with the highest form, man, he descends the whole scale of animal life, ending with the Protozoa, or Acrita. A general description of each class is followed by a more detailed account of each of the different orders which compose it. As a preface, "notes" taken from some of Prof. Owen's Hunterian Lectures on the principles of zoological classification, are, with the lecturer's permission, introduced.

The arrangement adopted is not the most modern. The Batrachina and the other Amphibia are retained as orders of the class Reptilia; the importance of the different sections of the Teleostei is considered to be as great as that of the Ganoidei or Plagiostomi; the Cirripedia are separated from the Crustacea; the "Bryozoa" are associated with the "Radiata," and the Entozoa are retained among the Articulata. More stress is laid on external peculiarities than is the custom now-a-days, among biologists, and the importance of embryology is not made prominent. Theoretical considerations are placed in the background, and illustrations are but few and far between. The fossil orders are described in their respective classes, and some of Prof. Owen's tables of the distribution in time of their different genera are introduced.

There is, no doubt, some advantage to a student with time at his disposal commencing the science upon an antiquated classification, for it enables him afterwards to more fully comprehend the history of biology, and to appreciate the rapid strides that have been made. We, however, fear that it is the object of most who take up the subject to obtain, as quickly as possible, a clear idea of its present position; and such being the case, to commence with a bygone system is only so much loss of time. The view taken by Dr. Blake will therefore detract from the value of his otherwise useful work. Another thing that will diminish its value is a certain want of accuracy which pervades it. Drawings of the feet of three birds are given, and they are all wrongly named. A scansorial foot is adjudged to a passerine bird; that of a kingfisher is said to be gallinaceous, whilst that of a steganopod is termed "foot of duck." More than once the peculiarities of two closely allied animals are reversed, as when we are told that among the Proboscidia "in one form, entirely extinct (Dinotherium), the incisors project in the form of long tusks from the upper jaw; in the existing elephants, from the lower jaw," and when "the articulated group (of the Brachiopoda are said to) possess an anal aperture, the non-articulated possess none whatever."

The chapter on the Pisces is much confused. "The living Ganoids have completely bony skeletons, but the fossil ones may have had skeletons soft and cartilaginous like those of the Sturgeons. . . . They have several holes in the arterial trunks. . . . Their optic nerves do not decussate, but merely cohere laterally." The external nares are said to be "simple" in the Rays and Sharks, or "double, as in most osseous fishes." The Ammocete is called the Sandlaunce, and it is described as a separate genus.

The same character is more than once repeated on the same or the following page, whilst others equally important are omitted. On the first page of the section describing the Reptilia, the two following sentences occur as parts of the definition of the class: "a heart with two auricles, and with the ventricle more or less completely divided;" "the heart has two auricles; the ventricle is imperfectly divided." Pentastoma is retained among the "Entozoa," instead of being placed among the Arachnida; we can find no reference to Ceratodus, a most important fish theoretically; and the brain of the Marsupials is said not to possess a corpus callosum.

Notwithstanding the imperfections above pointed out, there is much to be learnt from Dr. Blake's work; many of the descriptions are excellent; nevertheless there are so many essential facts omitted, that it will be found more valuable as an adjunct to a work like Prof. Huxley's "Introduction to the Classification of Animals," than as an independent source of information.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

"Instinct and Acquisition"

IN NATURE (vol. xii. p. 507) there appears, under the above heading, a very interesting article, being an epitome of a paper read by Mr. Spalding at the Bristol meeting of the British Association. Now that the doctrine which is maintained in this article—a doctrine with which Mr. Spalding's name is associated as almost its only experimental verifier—has proved itself so completely victorious in overcoming the counter-doctrine of "the individual-experience psychology"—and this along the whole line both of fact and theory—it seems unnecessary for anyone to adduce additional facts in confirmation of the views which Mr. Spalding advocates. I shall therefore confine myself to detailing a few results yielded by experiments which were designed to illustrate the subordinate doctrine thus alluded to in Mr. Spalding's article:—

"Though the instincts of animals appear and disappear in such seasonable correspondence with their own wants and the wants of their offspring as to be a standing subject of wonder, they have by no means the fixed and unalterable character by which some would distinguish them from the higher faculties of the human race. They vary in the individuals as does their physical structure. Animals can learn what they did not know by instinct and forget the instinctive knowledge which they never learned, while their instincts will often accommodate themselves to considerable changes in the order of external events. Everybody knows it to be a common practice to hatch ducks' eggs under a common hen, though in such cases the hen has to sit a week longer than on her own eggs. I tried an experiment to ascertain how far the time of sitting could be interfered with in the opposite direction. Two hens became broody on the same day, and I set them on dummies. On the third day I put two chicks a day old to one of the hens. She pecked at them once or twice, seemed rather fidgety, then took to them, called them to her, and entered on all the cares of a mother. The other hen was similarly tried, but with a very different result. She pecked at the chickens viciously, and both that day and the next stubbornly refused to have anything to do with them," &c.

It would have been well if Mr. Spalding had stated whether these two hens belonged to the same breed; for, as is of course well known, different breeds exhibit great variations in the character of the incubatory instinct. Here, for instance, is a curious case. Spanish hens, as is notorious, scarcely ever sit at all; but I have one purely-bred one just now that sat on dummies for three days, after which time her patience became exhausted. However, she seemed to think that the self-sacrifice she had undergone during these three days merited some reward, for, on leaving the nest, she turned foster-mother to all the Spanish chickens in the yard. These were sixteen in number, and of all ages, from that at which their own mothers had just left them up to full-grown chickens. It is remarkable, too, that although there were Brahma and Hamburg chickens in the same yard, the Spanish hen only adopted those that were of her own breed. It is now four weeks since this adoption took place, but the mother as yet shows no signs of wishing to cast off her heterogeneous brood, notwithstanding some of her adopted chickens have grown nearly as large as herself.

The following, however, is a better example of what may be called plasticity of instinct. Three years ago I gave a pea-fowl's egg to a Brahma hen to hatch. The hen was an old one, and had previously reared many broods of ordinary chickens with unusual success even for one of her breed. In order to hatch the

pea-chick she had to sit one week longer than is requisite to hatch an ordinary chick, but in this there is nothing very unusual, for, as Mr. Spalding observes, the same thing happens with every hen that hatches out a brood of ducklings.* The object with which I made this experiment, however, was that of ascertaining whether the period of maternal care subsequent to incubation admits, under peculiar conditions, of being prolonged; for a pea-chick requires such care for a very much longer time than does an ordinary chick. As the separation between a hen and her chickens always appears to be due to the former driving away the latter when they are old enough to shift for themselves, I scarcely expected the hen in this case to prolong her period of maternal care, and indeed only tried the experiment because I thought that if she did so the fact would be the best one imaginable to show in what a high degree hereditary instinct may be modified by peculiar individual experiences. The result was very surprising. For the enormous period of eighteen months this old Brahma hen remained with her ever-growing chicken, and throughout the whole of that time she continued to pay it unremitting attention. She never laid any eggs during this lengthened period of maternal supervision, and if at any time she became accidentally separated from her charge, the distress of both mother and chicken was very great. Eventually the separation seemed to take place on the side of the pea-cock; but it is remarkable that although the mother and chicken eventually separated, they never afterwards forgot each other, as usually appears to be the case with hens and their chickens. So long as they remained together the abnormal degree of pride which the mother showed in her wonderful chicken was most ludicrous; but I have no space to enter into details. It may be stated, however, that both before and after the separation the mother was in the habit of frequently combing out the top-knot of her son—she standing on a seat, or other eminence of suitable height, and he bending his head forwards with evident satisfaction. This fact is particularly noteworthy, because the practice of combing out the top-knot of their chickens is customary among pea-hens. In conclusion I may observe, that the pea-cock reared by this Brahma hen turned out a finer bird in every way than did any of his brothers of the same brood which were reared by their own mother, but that on repeating the experiment next year with another Brahma hen and several pea-chickens, the result was different, for the hen deserted her family at the time when it is natural for ordinary hens to do so, and in consequence all the pea-chickens miserably perished.

I have just concluded another experiment which is well worth recording. A bitch ferret strangled herself by trying to squeeze through too narrow an opening. She left a very young family of three orphans. These I gave, in the middle of the day, to a Brahma hen which had been sitting on dummies for about a month. She took to them almost immediately, and remained with them for rather more than a fortnight, at the end of which time I had to cause a separation, in consequence of the hen having suffocated one of the ferrets by standing on its neck. *During the whole of the time that the ferrets were left with the hen the latter had to sit upon the nest;* for the young ferrets, of course, were not able to follow the hen about as chickens would have done. The hen, as might be expected, was very much puzzled at the lethargy of her offspring. Two or three times a day she used to fly off the nest, calling upon her brood to follow; but upon hearing their cries of distress from cold, she always returned immediately and sat with patience for six or seven hours more. I should have said that it only took the hen one day to learn the meaning of these cries of distress; for after the first day she would always run in an agitated manner to any place where I concealed the ferrets, provided that this place was not too far away from the nest to prevent her from hearing the cries of distress. Yet I do not think it would be possible to conceive of a greater contrast than that between the shrill peeping note of a young chicken and the hoarse growling noise of a young ferret. On the other hand, I cannot say that the young ferrets ever seemed to learn the meanings of the hen's clucking. During the whole of the time that the hen was allowed to sit upon the ferrets she used to comb out their hair with her bill, in the same way as hens in general comb out the feathers of their chickens. While engaged in this process, however, she used frequently to stop and look with one eye at the wriggling nest-full with an inquiring gaze expressive of astonishment. At other times, also, her family gave her good reason to be surprised; for she used often to fly off the nest suddenly with a loud scream—an action which was doubtless due to the unaccustomed sensation of being nipped by the young ferrets in their search for the teats. It is further worth while to remark that the hen showed so much uneasiness of mind when the ferrets were taken from her to be fed, that at one time I thought she was going to desert them altogether. After this, therefore, the ferrets were always fed in the nest, and with this arrangement the hen was perfectly satisfied—apparently because she thought that she then had some share in the feeding process. At any rate she used to cluck when she saw the milk coming, and surveyed the feeding with evident satisfaction.

Altogether I consider this a very remarkable instance of the plasticity of instinct. The hen, it should be said, was a young one, and had never reared a brood of chickens. A few months before she reared the young ferrets she had been attacked and nearly killed by an old ferret which had escaped from his hutch. The young ferrets were taken from her several days before their eyes were open.

In conclusion I may add, that a few weeks before trying this experiment with the hen I tried a similar one with a rabbit. In this case the ferret was newly born, and I gave it to a white doe rabbit which had littered six days before. Unlike the hen, however, she perceived the imposture at once, and attacked the young ferret so savagely that she broke two of its legs before I could remove it. To have made this experiment parallel with the other, however, the two mothers ought to have littered on the same day. In this case the result would probably have been different; for I have heard that under such circumstances even such an intelligent animal as a bitch may be deceived into rearing a cat, and *vice versâ*.* GEORGE J. ROMANES

Dunskaith, Ross-shire, Oct. 10

* The greatest prolongation of the incubatory period I have ever known to occur was in the case of a pea-hen which sat very steadily on addled eggs for a period of four months, and had then to be forced off in order to save her life.

* *Apropos* to what Mr. Spalding says about the early age at which the instinctive antipathy of the cat to the dog becomes apparent, I may state that some months ago I tried an experiment with rabbits and ferrets somewhat similar to that which he describes with cats and dogs. Into an outhouse which contained a doe rabbit with a very young family I turned a ferret loose. The doe rabbit left her young ones, and the latter, as soon as they smelled the ferret, began to crawl about in so energetic a manner as to leave no doubt that the cause of the commotion was fear, and not merely the discomfort arising from the temporary absence of the mother.

Curious Australian and N. American Implement

A VERY interesting illustration of the occurrence of the same specialised implement in widely separated regions is found in the resemblance between the vermin hooks of the Australians and the same kind of weapon found among the Ute Indians. Several of the former were brought home by Wilkes' Expedition, and are found in the National Museum (Fig. 1). They

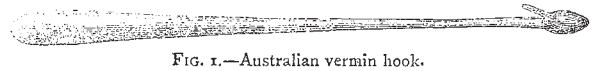

FIG. 1.—Australian vermin hook.

have highly finished handles, and the bone hook is fastened on with wrapping and gum. Of the latter, Major Powell, in his Colorado Report (1875), says, "These Indians all carry canes with a crooked handle, they say to kill rattlesnakes, and to pull rabbits from their holes" (Fig. 2).

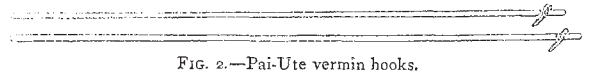

FIG. 2.—Pai-Ute vermin hooks.

The Ute implement is very rude, consisting of a switch merely, with the bark stripped off, and a nail passed through the thick end at an acute angle, and firmly lashed with sinew. Major Powell's Fig. 45, entitled "The Human Pickle," has two of these hooks (or canes) in his hand. O. T. MASON.

Washington, D.C., Oct. 13

OUR ASTRONOMICAL COLUMN

DOUBLE STARS. (1) ϕ ERIDANI.—In the year 1850 the late Capt. Jacob calculated two orbits for this binary system, the second of which represents very fairly his subsequent measures to the end of 1857, a rather severe test for elements founded upon the data available in 1850. We look in vain for measures later than Capt. Jacob's, though it may be hoped this and other interesting objects